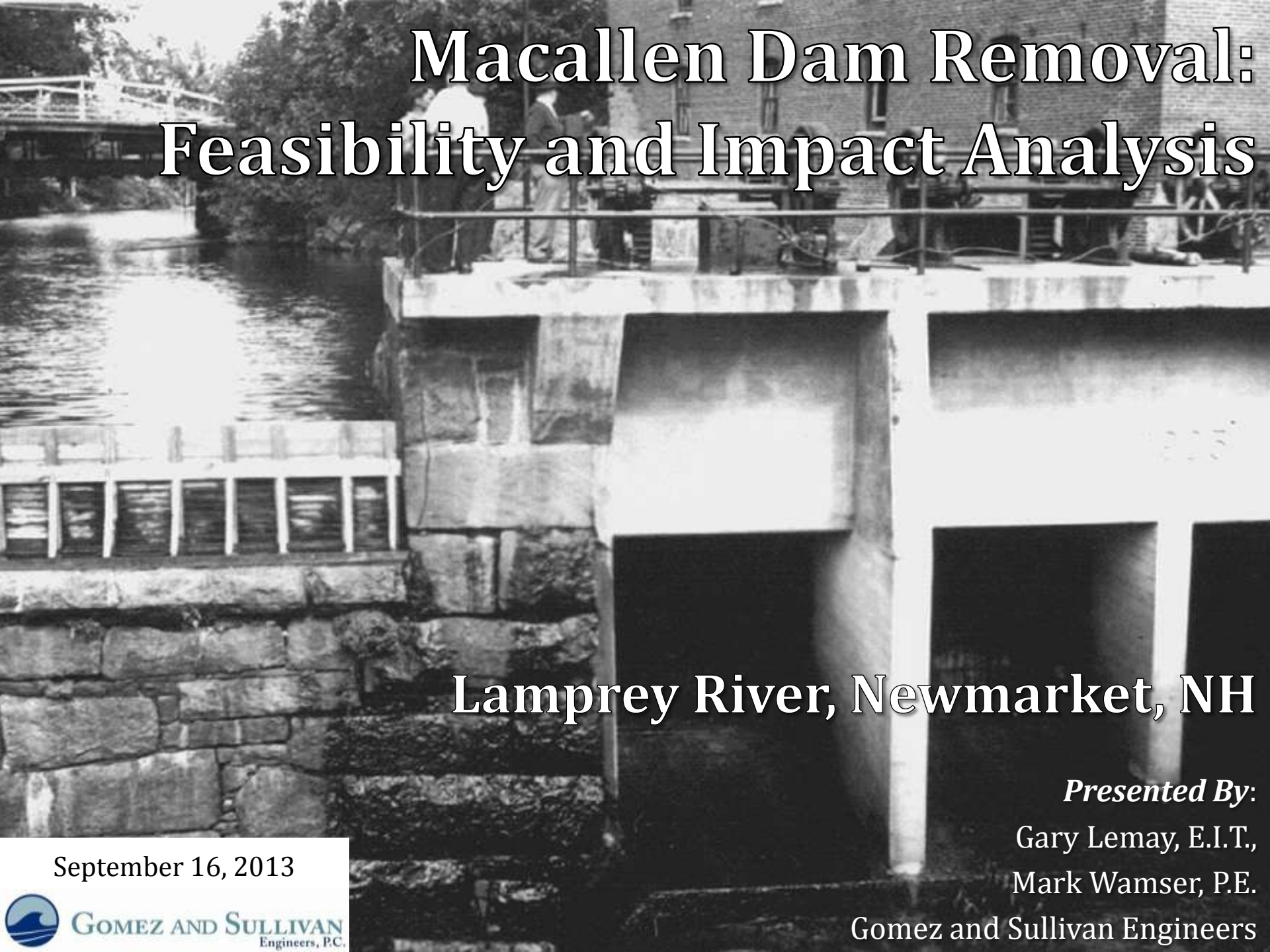


Macallen Dam Removal: Feasibility and Impact Analysis

Lamprey River, Newmarket, NH

Presented By:
Gary Lemay, E.I.T.,
Mark Wamser, P.E.
Gomez and Sullivan Engineers

September 16, 2013

GOMEZ AND SULLIVAN Engineers, P.C.

Agenda

- Opening Remarks & Introductions - Diane Hardy, Town Planner

- Presentation - Mark Wamser and Gary Lemay, Gomez and Sullivan
  - Meeting objectives
  - Study funding and technical assistance
  - Study motivation, objectives
  - Study background and approach
  - Contact information
  - Questions/comments

Meeting Objectives

1. Serving as Project kick-off meeting

2. Public notice for October 1 through October 10 impoundment drawdown, as part of the study

3. Summarize upcoming study

Study Funding and Technical Assistance

Study funded by:

1. Town of Newmarket
2. Conservation Law Foundation/NOAA: Conservation Law Foundation is the regional partner to NOAA/RAE, matching the federal funding to exciting, community-supported local restoration projects.

Technical Assistance provided by:

- Town of Newmarket
- NOAA
- NH Department of Environmental Services
- NH Fish and Game Department
- Town of Newmarket Dam Committee Members
  - Chris Hawkins, Citizen at Large
  - Michael Rury, Citizen at Large
  - Eric Botterman, Citizen at Large
  - Stephanie Coster, Newmarket Conservation Commission
  - Rick Malasky, Public Works Director
  - Diane Hardy, Town Planner
  - Dawn Genes, Lamprey River Watershed Association
  - Peter Wellenberger, Lamprey River Watershed Association
- Gomez and Sullivan Engineers

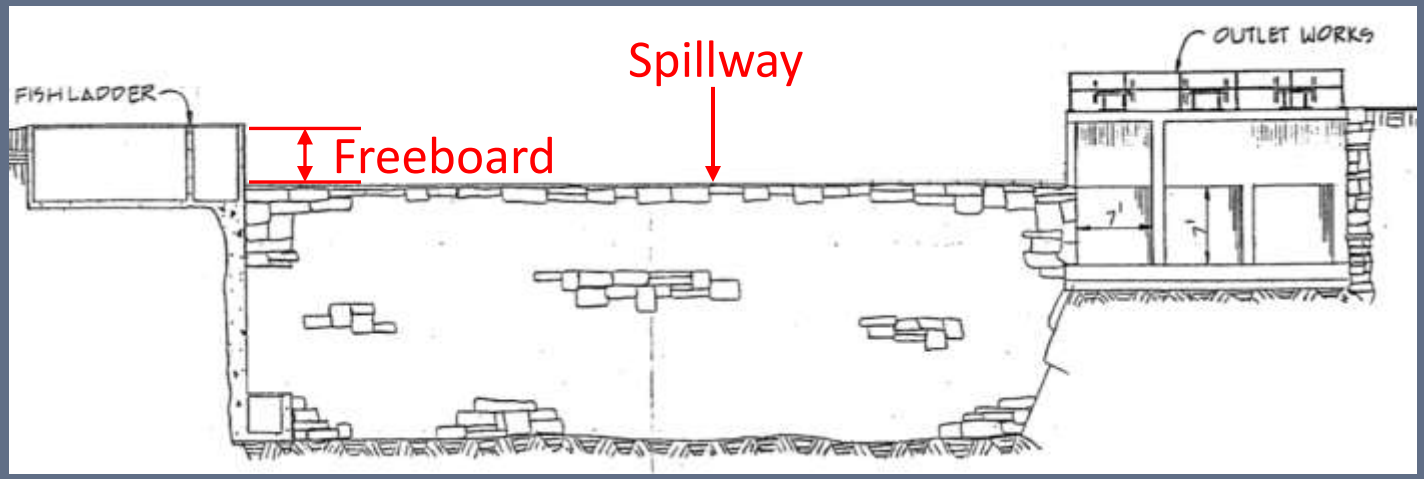
Study Motivation and Objectives

Why is the town evaluating dam removal?

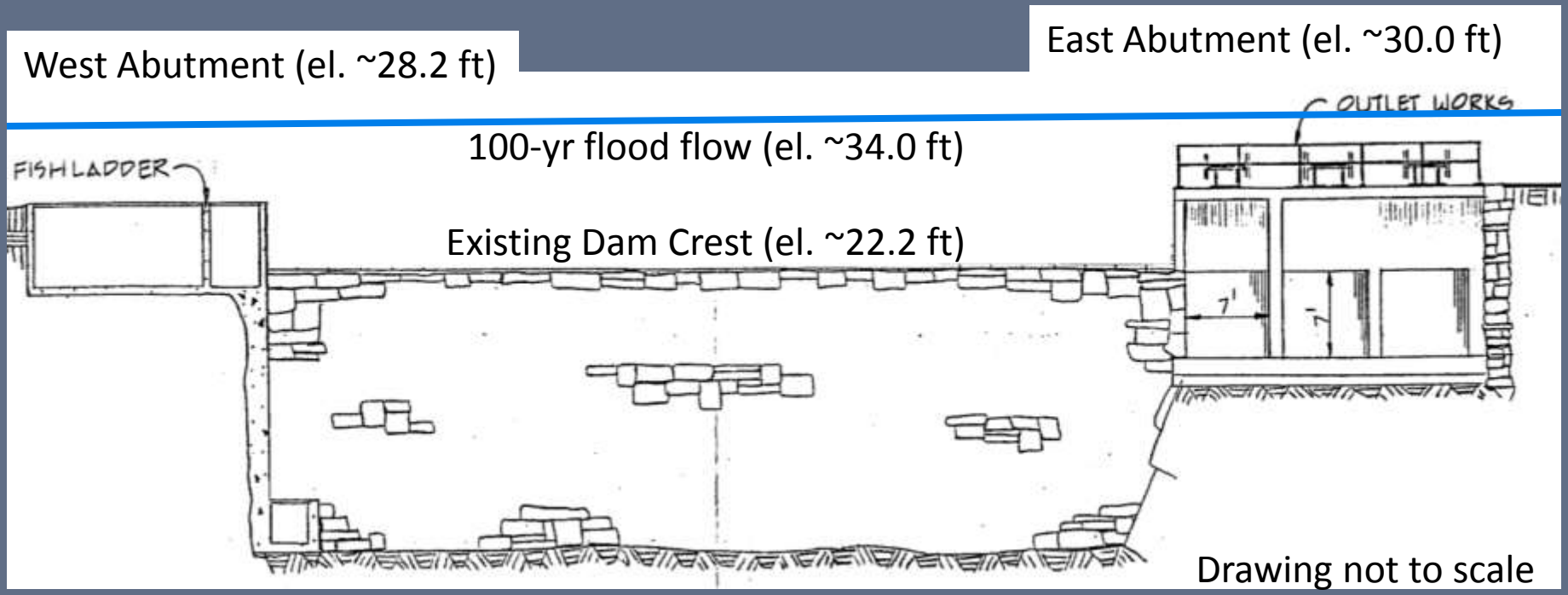
- NH DES sent a Letter of Deficiency (LOD) requiring dam repairs and noting inadequate spillway capacity.
- Dam cannot pass 100-yr flood (10,259 cfs) with one foot of freeboard, as required by NHDES Dam Bureau dam safety requirements.
- Dam modifications are needed to pass the 100-yr flood.
- Following recent (2006, 2007, 2010) flooding, some Newmarket residents petitioned the Town Council to evaluate dam removal as an option to dam modification.
- Wright-Pierce conducted a study to review dam modification alternatives.

What are the potential options for modifying the dam to pass the 100-yr flood?

- To pass the 100-yr flood, the existing dam spillway must be modified. Spillway capacity can be increased by:
  - Widening the spillway
  - Lowering the spillway elevation
  - Combination of the above
- Wright-Pierce (W-P) presented several "potentially feasible" dam modification options in their February 2013 report.
- W-P had a cost range to modify the dam from $1.1M - $4.6M.



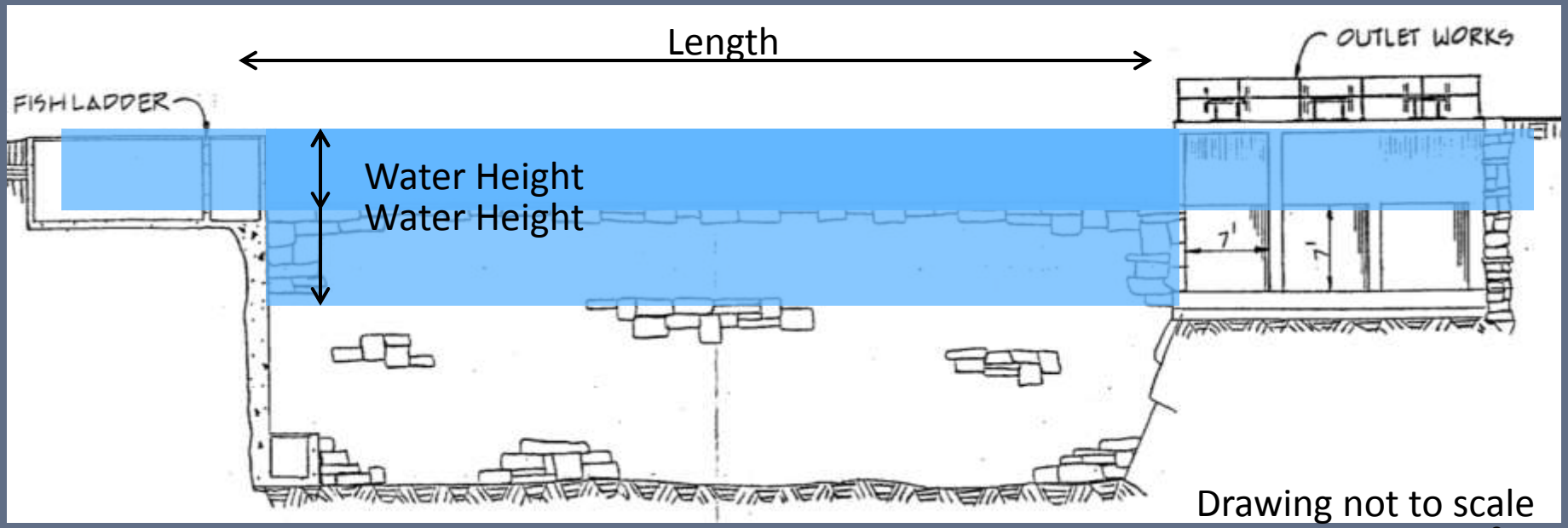
Macallen Dam – Existing Setup



Looking Upstream

How to Increase Spillway Capacity

- Spillway Flow = (Weir Coefficient) * Length * Water Height$^{1.5}$
- To increase spillway capacity, you must:
  - Increase spillway length
  - Decrease spillway height (therefore increasing water height)
  - Combination of the above
- Doubling the length doubles (2 x) the spillway capacity.
- Doubling the water height nearly triples (2.8 x) the capacity.



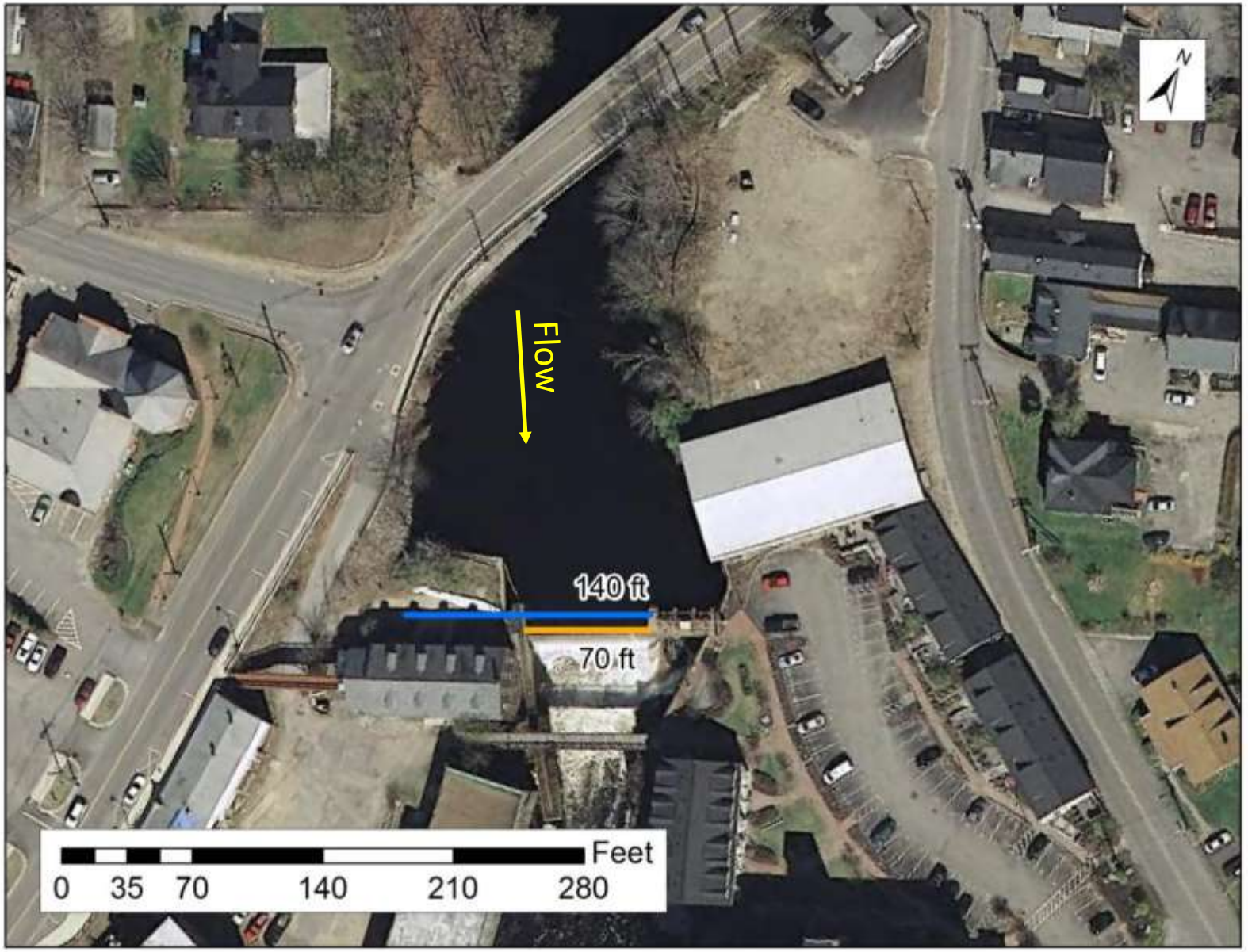
What are realistic options for passing the 100-yr flood?

- Based on site constraints, lengthening the spillway does not appear feasible. The remaining options include lowering the spillway crest elevation and raising the abutment elevation.

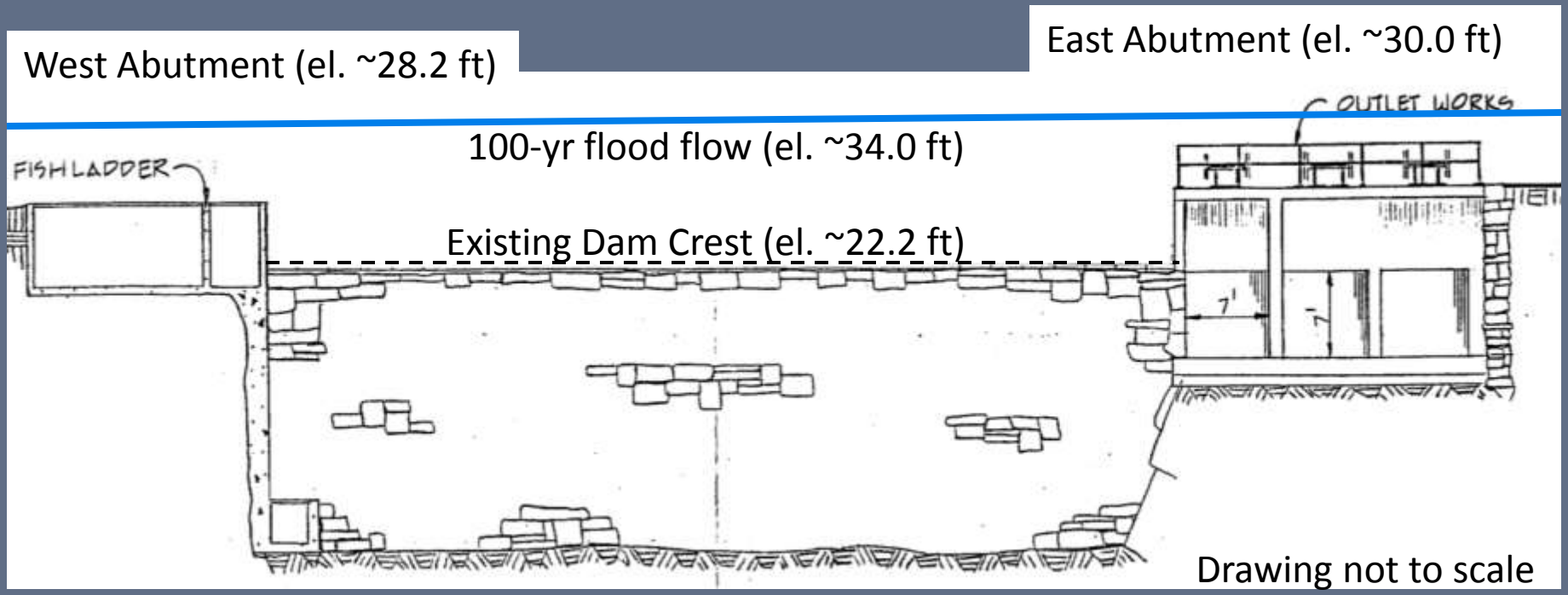
W-P Alternative No.	How many feet is spillway crest elevation lowered	W-P budgetary estimate
2 (lower spillway)	~9.6 ft	$1.1 M
5 (lower spillway, raise abutment)	~7.8 ft	$1.3 M

- Both options will reduce water elevations upstream of the dam during low and high flow periods (relative to current conditions).
  - Greatest water level decrease expected during lower flow periods.

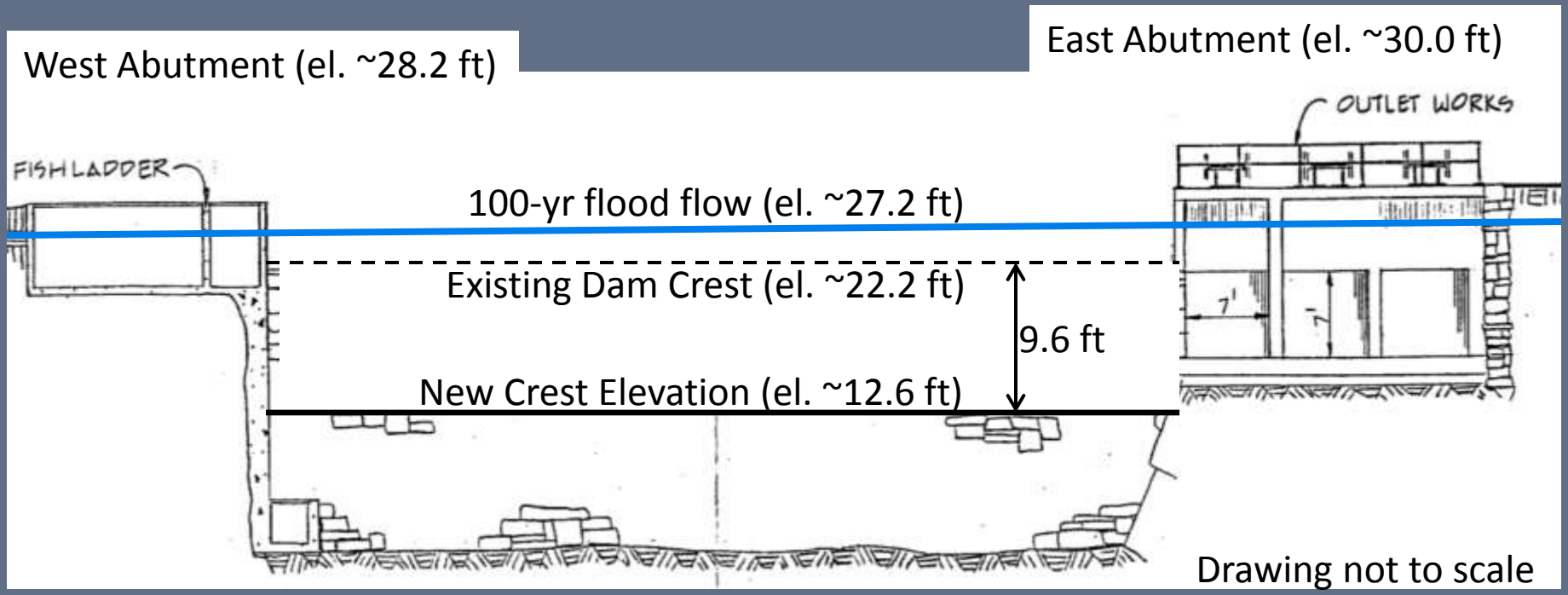
What are realistic dam modification options?



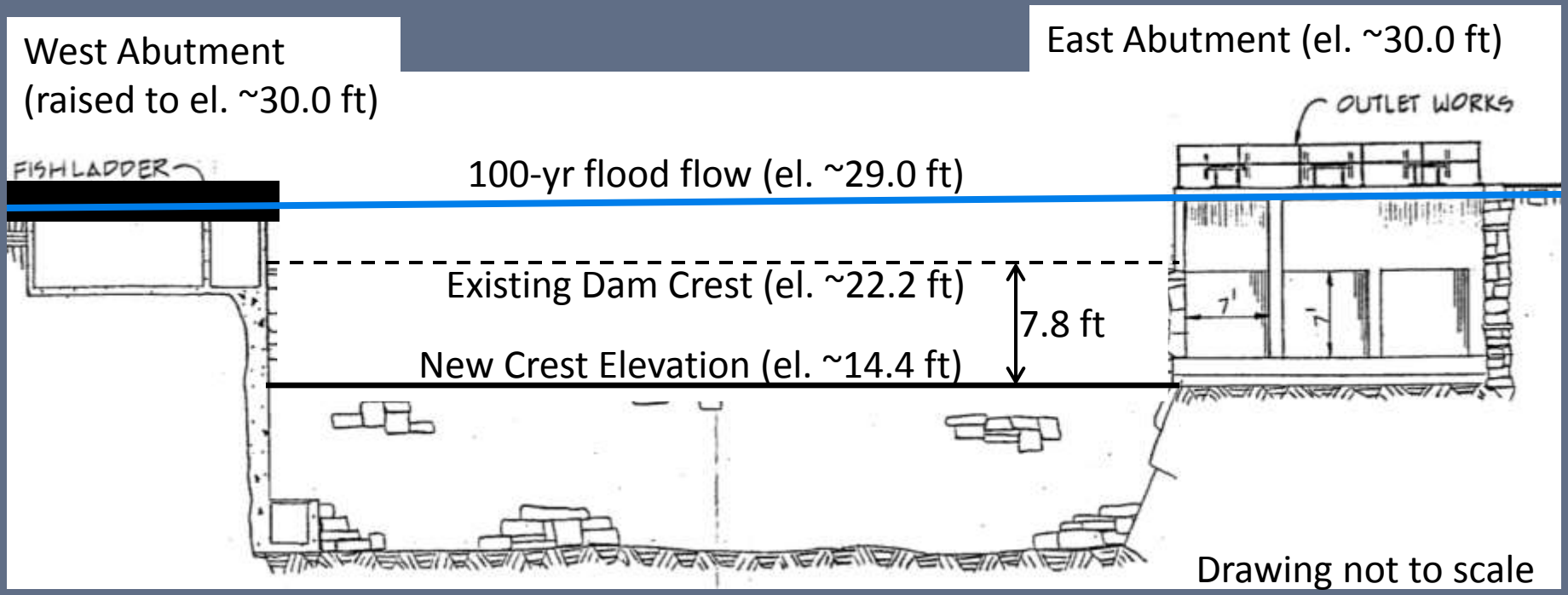
Macallen Dam – Existing Setup



Lower Spillway Elevation– W-P Alternative 2



Lower Spillway Elevation, Raise West Abutment Elevation– W-P Alternative 5



Why Consider Dam Removal?

- Changes to the dam are needed to meet dam safety regulations.
- Dam contributes to upstream flooding.
- Dam may block passage of resident & migratory fish that don't utilize the ladder.
  - One species of river herring heavily utilize the existing ladder.
- Dam is a liability, potential safety hazard and requires continual operation, maintenance and repairs with taxpayer monies.
  - Removal would address NHDES Letter of Deficiency and spillway capacity issues and eliminate any future cost/liability.
- Dam has an Annual Dam Registration Fee.
- Grant funding available to offset costs of feasibility study, and potential future removal.

Study Goals

- Characterize the feasibility, cost and impacts (economic, environmental, historic) of removing Macallen Dam.

- Present unbiased, factual findings in the context of other feasible alternatives so the Town can make an informed decision on how to address the Macallen Dam Letter of Deficiency.

Feasibility Study Deliverables

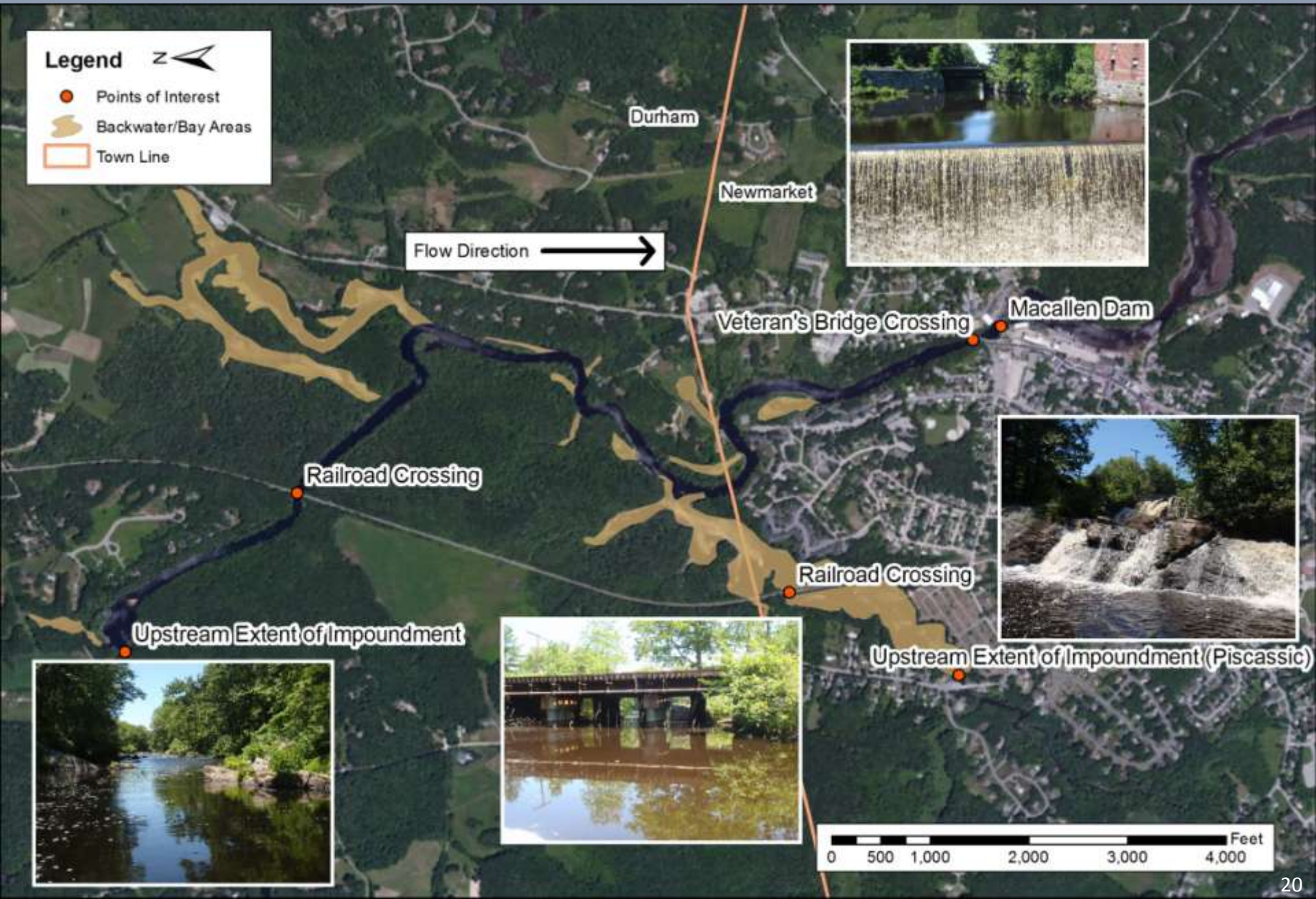
- Bathymetry and Dam Structure/Topography Survey
  - Used for hydraulic modeling, project drawings, access locations
- Cultural Resources Assessment
- Hydraulic Analysis
  - What will the impoundment look like (depth, width) if the dam is lowered or removed?
- Potential Structural Impacts to Veteran's Bridge and Other Infrastructure
- Sediment Due Diligence
- Potential Groundwater Well Impacts

Feasibility Study Deliverables (continued)

- A Visual Rendering of dam removed
- Order of Magnitude Cost Estimate for Removal and any additional tasks associated with the feasibility study
- Draft and Final Feasibility Report
  - Summarizes all study tasks into a comprehensive, factual document that does not recommend any particular option
- Three public meetings
  - Kick-off meeting (today)
  - Draft feasibility report review (winter 2014)
  - Final feasibility report review (spring 2014)

Study Background and Approach

Macallen Dam – Geographic Range



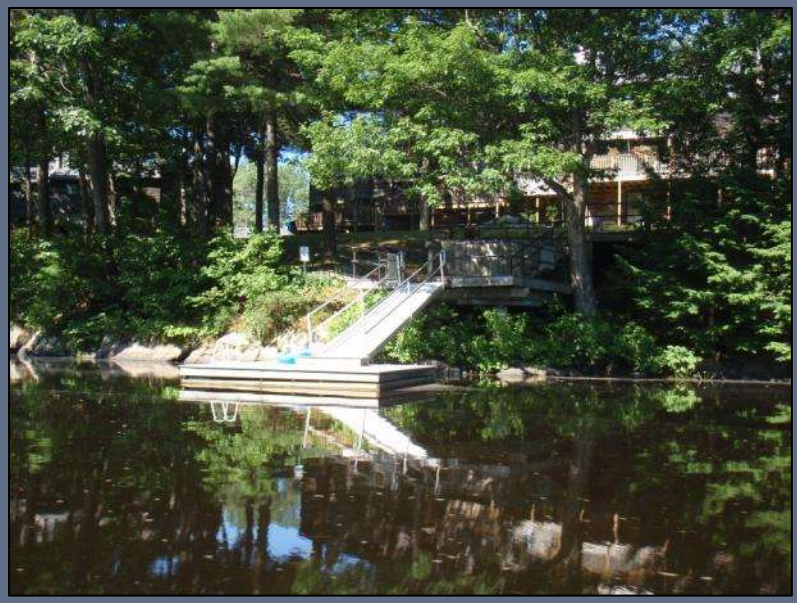
Shoreline Development


House susceptible to flooding

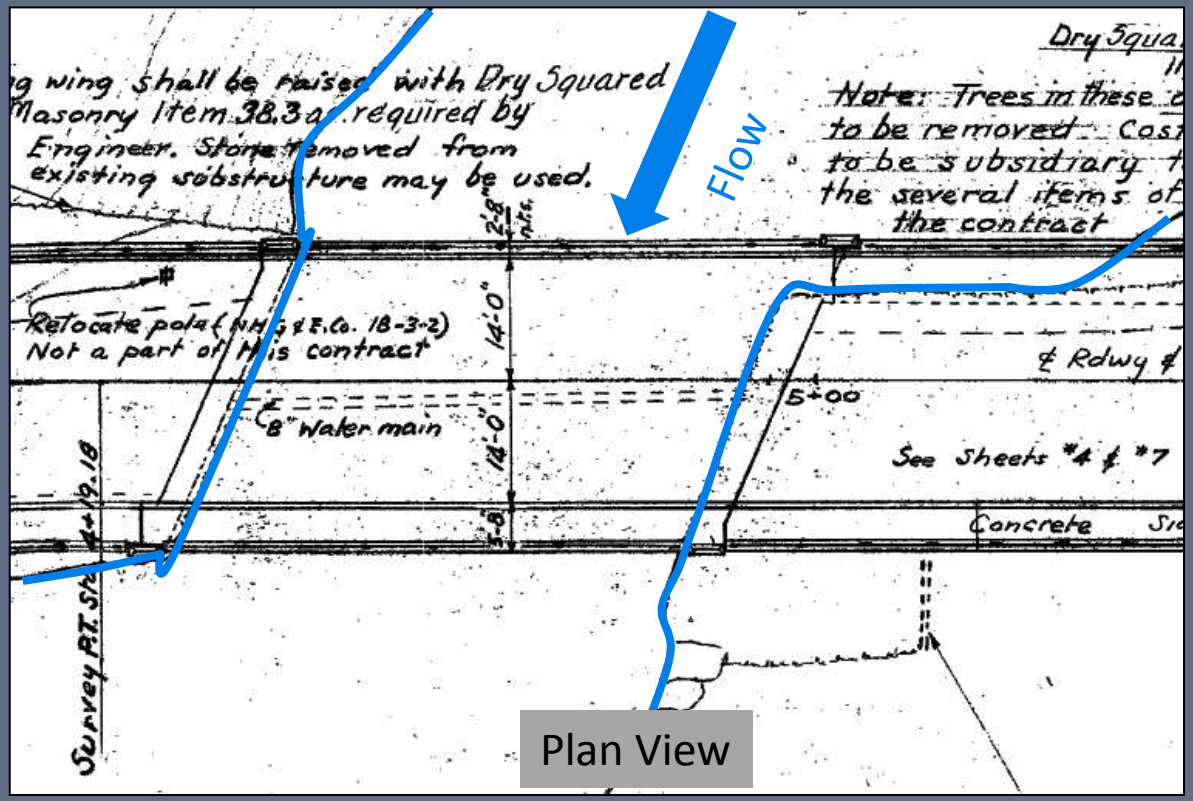

Condos overlooking river

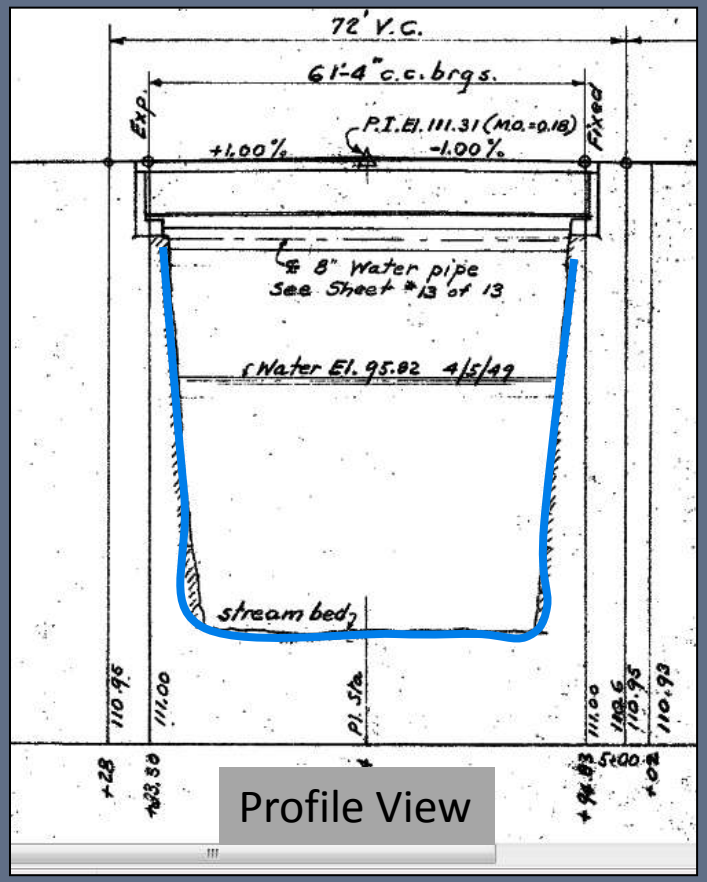
Recreation

Piscassic Boat Launch



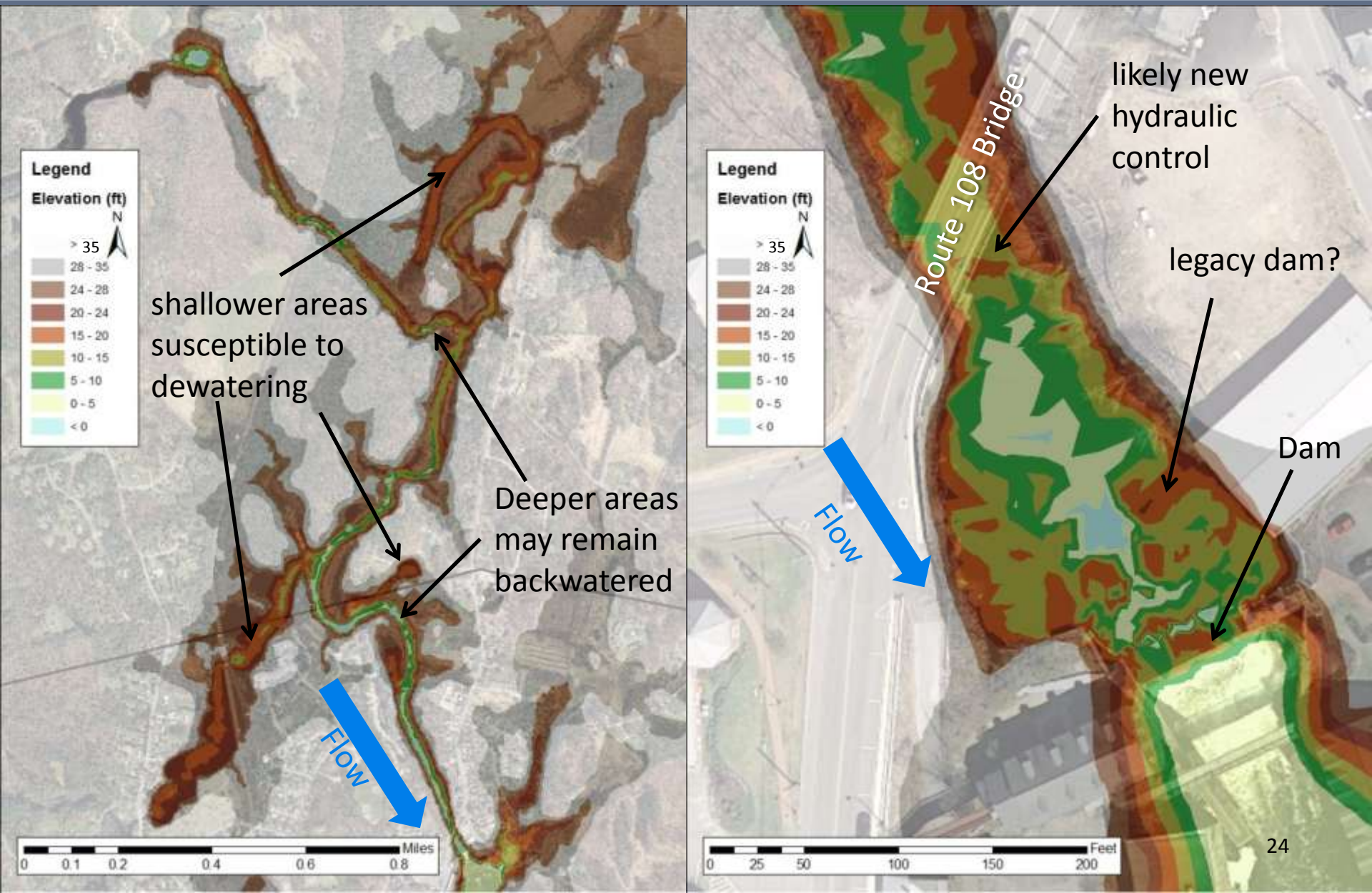
Route 108 Bridge





- Bridge opening (~60’) narrower than dam spillway (~70’).
- If the dam is removed, the bridge may serve as a hydraulic control and influence upstream water elevations during floods.

Preliminary Bathymetry Survey



If the Macallen Dam is Removed…..

- Water levels (depths) will decrease, river width will decrease and water velocity will increase.
- Based on historic research, dam built on historic “First Falls”. So, the native river bed may act as a hydraulic control.
- Parts of the river may look more like the Packers Falls reach.
- Some existing deep pools may remain somewhat slow-moving and relatively deep.

What isn't addressed in this study scope

- No sediment testing, wetlands delineation, evaluation of potential property value impacts and socioeconomic impacts of dam removal are being conducted at this time.
- Detailed recreation evaluation is not being conducted.
- Study will rely on previous W-P cost estimates for the non-removal alternatives. Cost and feasibility of these options will not be re-addressed.
- Ways to divert more water away from the Lamprey River into the Oyster River watershed.
- The town may choose to look into these and other options at a later date, but they are not in the scope of this study.

Next Steps

- Impoundment Drawdown (Oct 1 to Oct 10, 2013)
  - Photo-documentation, dam structure survey, infrastructure investigation, sediment depth probing
  - ~3-day gradual drawdown and refill
- Draft Feasibility Report: Target Winter 2014
  - Public meeting to follow draft feasibility report
- Final Feasibility Report: Target Spring 2014
  - Public meeting to follow final feasibility report
- The Town, in consultation with DES Dam Bureau, may consider other unstudied options or choose from the available alternatives (modification, removal) what the best path forward is to meet dam safety requirements

Impoundment Drawdown

- The Town will draw down the Macallen Dam impoundment as part of this study.
- The drawdown will begin on Oct 1, 2013 and be refilled by Oct 10, 2013.
- The drawdown and refill will each occur gradually over three days.
- Full drawdown approximately Oct 4 through Oct 7.
- We will conduct photo-documentation, a dam structure survey, an infrastructure investigation and sediment probing.
- Water levels may drop up to 6 ft at the peak drawdown.

Contact Information

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QUESTIONS?